GAS JOURNAL, OCT. 11, 1944

VOL. 244 96th YEAR No. 4247

EDITORIAL NOTES

NORTHOLT

FOLLOWING a fairly rapid survey of the Government-sponsored houses at Northolt, erected in an atmosphere of profound secrecy and then with dramatic suddenness thrown open for inspection by representatives of local authorities, we wrote a short note about them in these columns last week, and we also gave a factual list of the gas and coke appliances installed in them. We return to the matter again to bring into rather more relief the impression we gained of the extremely able manner in which the Gas Industry has linked up with and amplified the Government's effort—an achievement far and away beyond what we may term propaganda. The Industry's part has not been just the fitting of a gas or a coke appliance here and there with coloured labels to indicate how wonderful such appliances are. What is to be seen at Northolt is really a demonstration of modern and refined heat service sufficiently flexible to suit a very wide variety of consumer taste, the while not asking too much of the consumer pocket. It is an example of thoughtful planning of a most effective nature, constructive, educative, and altogether helpful; and, as we hinted last week, its effectiveness is the result of close practical co-operation between the Gas Industry, working through the representative channel of the Domestic Heat Services Committee of the British Gas Federation, and the several Government Ministries concerned in the post-war housing programme.

The gas and coke equipment installed in the Northolt houses is a practical display, essentially flexible, and marked by new conceptions of installation work fitting in with the views and the ideas of the Ministry of Works in regard to layout. The result is not the outcome of the waving of a magic wand. It is the outcome of a very great deal of spadework, and we think that the Ministry of Works would be the first to concede that the assistance given over quite a long period now by the Gas Industry has been valuable. The Industry's approach to the problem, it seems to us, has been knowledgeable and understanding. The complete heat-service installations shown have been designed as a service, not as a collection of appliances, however good looking in themselves. Working through the Domestic Heat Services Committee the Industry has put forward its views on coal conservation, running costs, adequate ventilation, and its ability to offer types of heat service calculated to meet economically a variety of conditions, to fulfil the requirements of what is very loosely termed the "lower income group." Those responsible for this practical demonstration have had to think in terms of unit construction capable of dropping-in, as it were, into the Government plan. In no sense are the Northolt houses Gas Industry houses—and the Gas Industry has its views on house design—they are Government-designed dwellings in which gas and coke have found expression and met with approval. And we would add that the gas and coke installations on view are examples, suggestions, nothing in the nature of a hard and fast take it or leave it principle. The fundamental installation work, carried out to modern specification, is there; the appliances there are examples of what can be done. The wide variety of appliances the Industry has and the manufacturers will be able to offer in due course is far too catholic to allow of anything more than this. What is assured is that the Industry through co-operative planning can in fact give the public a standard of heat service better than that of pre-war days. We can then—indeed we must—regard the Northolt scheme as a beginning. The implied recommendations might well be followed up by the construction of further houses much farther removed from London than is Northolt, and in saying this we are not unmindful of the work which is being and has already been done in several cities and towns.

We suppose that primarily a house is something to live in rather than to look at—something to "house" one decently and with propriety—and in this note we are concerned with the inward and convenient rather than the outward and beautiful. But we must say that the Government houses at Northolt eschew the æsthetic as regards external appearances, that no nation-wide "ugliness competition" could have produced uglier effects. However, as we say, it is the interior that chiefly interests us; and the way gas and coke fit into this interior is definitely as to the manner born. To our mind the equipment is in advance of the space-planning. In some of the houses certain features—such as airing cupboards fit for the drying of a few ladies' handkerchiefs only, and built-in wardrobes the use of which demands considerable gymnastic skill coupled with a standard body—show a great departure from common sense. Indeed, the equipment and its method of installation appeared to us not only the major attraction to the future occupier but the remedying feature of the whole; and even if the best available gas and coke appliances, for the most part of pre-war vintage, are not representative of things to come, they are far in advance, both in finish and performance, of the general run of household amenities pre-war. It is well understood and appreciated why many of the ideas of appliance makers are only in the paper stage; equally we know that the ideas are there in plenty waiting for translation on the release from more immediate duties of labour generally and skilled technical men in particular. There is bound to be a time lag in the transition from armament-making to the appliance production which will be demanded. With all this in mind it is all the more encouraging to record wartime developments in gas utilization technique. An example which we may single out is the raising of the efficiency of gas space-heating equipment designed for continuous as distinct from intermittent use—raising the efficiency by combining convection with radiation, and thereby proportionally reducing running cost. The gas appliance concerned, by the way, which we mentioned in general terms in last week's "JOURNAL," has "luminous" burners and radiants of a new type which can be described as unbreakable. Another wartime development in gas appliance design we shall mention later. Our point is that the Gas Industry—irrespective of what it will be able to offer as circumstances permit—is *vis-à-vis* any other fuel service as modern as may be, and as far as Northolt at any rate is concerned is showing that it is going forward as a composite heat service and not as a haphazard handler of appliances to utilize its products. We found Northolt, from this point of view, encouraging and stimulating; and Northolt, we would repeat, is a beginning. As such it stands not just as justification of the need for a Domestic Heat Services Committee speaking for the Industry, but as proof of the Committee's efficacy in circumstances the reverse of ideal.

WATER HEATER DEVELOPMENT

ON later pages of this issue of the "JOURNAL" we describe in detail an important phase in the development and improvement of water heater design. The work has been carried out for some years, under very difficult conditions, by Radiation Ltd., the aim being to combine maximum operational efficiency from gas water heaters with an absolute minimum of maintenance attention; and the result is impressive. The method of approach has been twofold—to eliminate corrosion on the "gas faces" of the appliance, and secondly and concur-

rently to eliminate the formation of scale on the water faces. Both factors are of obvious importance in their bearing on the life of the appliance, its maintenance cost, and its continued high thermal efficiency, on which, of course, depends its running cost. The problem is easy to state, but it is not so easy to arrive at a satisfactory practical solution meeting the requirements of everyday use on the district. That in spite of wartime difficulties, which all will understand and appreciate, Radiation have in fact arrived at such a solution is all the more notable and praiseworthy; and as with other developments undertaken by the firm, the one under review has not been introduced to the Gas Industry without previous prolonged test under normal district conditions.

The technical story of the work is there for everybody to study, but we may mention here that, as the outcome of lengthy investigation and trial and of much ingenuity and skill in design, there has been produced in the first place a heat and corrosion resisting alloy of good thermal conductivity and having a coefficient of thermal expansion the same as that of copper. A transfer efficiency of 75% in the heater has been attained. Extended district trials under conditions particularly favourable to corrosive attack have indicated that need for maintenance from this cause has been reduced to a minimum if not eliminated entirely. That is one angle; the other has been the elimination of scale formation. On the principle that prevention is better than cure, Radiation have brought out a "dispenser," fully described in our article, to secure proportionate dosage to the water flowing through the heater of a reagent (a dosage of the order of two to five parts per million only) which minimizes hard water scale formation. Here, again, extensive district tests in many different parts of the country and under widely differing conditions of hard water supply have shown how this treatment will usually almost completely suppress the formation of scale within the appliance. We think it will be agreed that the outcome of this dual approach to the problem under discussion is a positive contribution towards the extension of the gas water heating load in the post-war years.

Personal

In addition to his recent appointment as General Manager and Chief Engineer of the Oxford and District Gas Company, Mr. ALEXANDER TRAN has been appointed a Director, General Manager, and Chief Engineer of the South Midland Gas Corporation, Limited. The Corporation, which is in close association with the Oxford and District Gas Company, controls the Gas Undertakings of Banbury, Eynsham, and Witney.

* * *

Consequent upon the retirement of Mr. J. WARRILLOW, Works Manager of the Stoke-on-Trent Gas Undertaking, Mr. F. J. BRIDGWOOD, previously Assistant Works Manager, has been appointed to take over the position of Works Manager as from Oct. 1.

Mr. G. S. BULLOCK, previously Carbonizing Superintendent, has been promoted to Assistant Works Manager, and Mr. L. S. WRIGHT has been appointed Carbonizing Superintendent.

Letters to the Editor

Examinations and Personal Recruitment

DEAR SIR,—The recent famous last words, "Don't you know that there's a war on?" prompt me to reply to Mr. Le Fevre's letter of Aug. 24 ("JOURNAL" of Aug. 30).

His criticism of the poor quality of the boys recruited for gasfitting work is no doubt justified by the results of the 1944 Grade I Examination, *vide* 86 candidates failed out of 141 entered. Although, on the face of it, this indicates an unsatisfactory state of affairs, I am of the opinion that it is purely a passing phase caused entirely by war conditions. The under-mentioned summary indicates the City and Guilds Grade I Examination results for four years:

Year.	Passed.	Failed.
1938	692	228
1939	664	244
1940	243	74
1944	55	86

In the years 1938–39 before the war started the results will be seen to be quite reasonable, bearing in mind that 75% of successes out of the total number of candidates entered is satisfactory, and I can find no trace of a direct criticism of the quality of candidates who entered for these examinations, although the answers to the questions, as usual, were the subject of some comment. It will be seen that after 1939 the number of candidates entered dropped considerably. This was probably caused by the discontinuation of Gasfitting Classes in various parts of the country. In spite of this, however, the same ratio of passes occurred in 1940. From 1940 up till 1944 the position has greatly deteriorated until, as will be seen, in 1944, 86 candidates failed out of 141 entries.

I am convinced that the reason for the deterioration in the type of boys now available is not due to haphazard methods of selection by gas undertakings, but is the result of the types of material produced by the schools during the wartime period. It must be borne in mind that the majority of the boys that have been recruited during the past three years are those most affected from the schooling point of view by the war. Comprehensive schemes of evacuation have caused disorganization of their classes. In some cases only part-time schooling has been possible, and that of a very low standard. In fact, most of the elementary school-children of to-day have been "chivied about" all over the place, and it is this, I feel confident, that has subscribed to the poor basic education of which Mr. Le Fevre complains. Those school-children who have not been evacuated have been subjected to long periods of time in shelters, and have borne the brunt of bombing attacks by the enemy which, in their wake, have brought complete unsettlement to the teachers and the students.

I would remind Mr. Le Fevre that the criticism of selection which he makes cannot be levelled, as he says, at some undertakings, but if it is true they must be levelled at all of the large undertakings which, for the most part, provide the majority of the students for the Grade I Examination. I know that most of the large undertakings make very careful selection of their personnel in like manner to Mr. Le Fevre's own undertaking.

I have not found from experience of Juvenile Employment Exchanges that they are in the habit of sending all their duds to the gas company. In fact, it is the reverse. The Juvenile Employment Secretary is fully aware of our requirements, and the standard and quality of the boy who was submitted for recruitment in pre-war days were reasonably high. I speak upon this matter in an official capacity as the Vice-Chairman of the Ministry of Labour Juvenile Advisory Committee in part of the County of Sussex.

The Juvenile Section of the Ministry of Labour to-day is quite a highly organized department, and an official secretary or officer is appointed to deal with juvenile labour. These secretaries are, for the most part, trained, and have complete knowledge of the districts in which they work, and details of the various industries and opportunities offered, and types of person required.

I do not know whether Mr. Le Fevre is entirely aware of these facts, and I would recommend him to read a Ministry of Labour publication called "The Young Worker," in which a complete survey of the present up-to-date system of Juvenile Employment is dealt with at some length.

I make these criticisms from the constructional point of view, as I feel that the fact of lack of education, due to wartime conditions, is largely responsible for the low standard, and it is somewhat unfair to criticize the boys on this score, when it is not due to any fault of their own.

With regard to making the schools aware of the opportunities offered by the gas undertakings, in this area talks are given to schools before school-leaving time, and full details of the jobs available in the Industry are given.

As a finale to this note I would make one important comment, and that is, is the Gas Industry satisfied that the opportunities which it offers to prospective operatives are of the order that will attract the right type of boy? When one considers the standard which we try to get the fitters to attain, it is debatable as to whether the final remuneration for such knowledge is really worth while. I am all for raising the status of the gasfitter; and if we are to get good workmanship, we shall have to pay for it.

With regard to the future recruitment of personnel, I am afraid it comes to the fact that half a loaf is better than none at all, and that it will be up to each undertaking to endeavour to train the boys who are available up to the standard they require.

Brighton, Hove, and Worthing Gas Company,
77, West Street, Brighton.
Oct. 5, 1944.

Yours faithfully,
J. H. C. BATES,
Technical Supervisor.

The Salaries Question

DEAR SIR,—In your issue of Sept. 27 Mr. Ainley focuses attention on the real difficulty—namely, that many staff workers in the Gas Industry are unorganized and, therefore, unable effectively to make their views known.

The policy of settling rates of remuneration by collective bargaining is now widely recognized throughout industry, and the manual workers in the Gas Industry have well-established machinery for this purpose. While the Clerical and Administrative Workers' Union has negotiated agreements with certain gas companies in respect of clerical staffs who are members of the Union, there remain large sections of staff workers in the Industry who are unorganized, unprotected by collective agreements, and at the mercy of individual bargaining.

Standards applicable to the Gas Industry as a whole and acceptable to those concerned will be established only when the staff workers see the wisdom of an organized approach. Mention has been made of the method adopted in engineering, a method followed by this Union and the Engineering and Allied Employers' National Federation since 1920. Similar methods of negotiating have been established for clerical workers in sections of the coal industry, and the principle of consultation in the settlement of rates operates for staff workers over a wide field. Employers are increasingly recognizing the value of an orderly approach, and our members are only too glad to relinquish the doubtful advantages of merit increases in favour of known and recognized scales negotiated by their Union.

Yours faithfully,

Clerical and Administrative Workers' Union,
30, *Clouston Street,*
Glasgow, N.W.
Oct. 4, 1944.

B. ANNE GODWIN,
Asst. General Secretary.

Midland Association

A General Meeting of the Midland Association of Gas Engineers and Managers was held at the offices of the Midland Counties Coke Association, Birmingham, on Oct. 5. The President (Mr. T. F. E. Rhead) occupied the chair.

It was announced that Mr. Fred Davies, of Walsall, had been made an honorary member of the Association.

The President said he thought the election would meet with general approval. Mr. Davies had done very fine work for the Association right up to the time he was taken ill.

The following new members were elected: Mr. J. Corrigan, Engineer and Manager, Loughborough, and Mr. A. G. Holtam, Distribution Engineer and Manager, Cheltenham.

The President presented the Certificates to successful candidates in the recent I.G.E. examinations.

The President made sympathetic reference to the late Mr. Alexander MacKay.

Mr. C. F. W. Rendle gave a review of the business of recent Council meetings of The Institution of Gas Engineers, and said the Midlands were well represented with five members. They had a member, Mr. Pearson, on the Careers Committee, and Mr. Harold Bate had been appointed an Examiner in Gas Engineering (Manufacture).

Dr. F. J. Dent, Joint Assistant Director, Gas Research Board, read a Paper entitled "The Production of Gaseous Hydrocarbons by the Hydrogenation of Coal."

The Paper, which will be published subsequently in the "JOURNAL," had also been read on the previous day to members of the Midland Junior Gas Association under the Chairmanship of the President, Mr. F. J. Bengough.

Midland Juniors

The Saltley Works of the Birmingham Gas Department were inspected by members of the Midland Junior Gas Association on Sept. 30. The President of the Association, Mr. F. J. Bengough, is Assistant Engineer at the Works.

After the tour of the works about 80 members were entertained at tea at the invitation of the Gas Committee in the new Central Laboratory. They were welcomed by Mr. George C. Pearson, Engineer-in-Chief of the Birmingham Gas Department, who apologized for the unavoidable absence of the Chairman of the Gas Committee (Alderman J. C. Burman) and the General Manager and Secretary (Mr. A. W. Smith).

A welcome was also given by Mr. T. F. E. Rhead, who remarked that he did so as a member of the Junior Association, the Senior Association, and Chief Chemist of the Department.

On behalf of the visitors a vote of thanks to the Gas Committee and the General Manager of the Birmingham Gas Department was proposed by Mr. S. C. Bentley (Oxford), seconded by Mr. A. W. Attwood (Coventry); and Mr. Allbutt (Engineer, Saltley Works) replied.

Changes at Halifax

The Halifax Town Council has approved that under the direction and control of the Gas Engineer and Manager (Mr. J. MacLusky), who will be designated Engineer and General Manager, responsibility for the work of the Gas Department shall be delegated departmentally as follows: (*a*) Works Manager; (*b*) Distribution Superintendent; (*c*) Chief Administrative Officer (at present designated Commercial Assistant). The post of Works Manager has been offered to Mr. Morris P. Bradley, Assistant Engineer and Manager at the Gas-Works. The position of Assistant Engineer and Manager has been abolished.

Boiler Blow-Down

There is much about boiler blow-down which so far has been a "closed book" to many works engineers and boilerhouse men. Much depends upon correct blow-down conditions, and some authoritative guidance on the subject is timely. This guidance is offered in a new Bulletin issued by the Ministry of Fuel and Power, and every steam-boiler user will find it to be of benefit.

The bulletin begins by explaining why blow-down is necessary. Having made that point clear, it gives a useful guide as to the best time to blow down. It then proceeds to describe the routine control of blow-down, and to examine the factors which influence the amount of blowing down necessary to prevent priming. The value and use of the hydrometer in testing samples of boiler water to ascertain the amount of dissolved solids it contains are dealt with at length. The need for careful supervision where continuous blow-down is fitted, in order to prevent unnecessary loss of heat (and fuel), is stressed. Then follows a section on heat recovery from continuous blow-down. Much has yet to be done in this direction as a source of fuel saving.

The bulletin also gives clear directions for calculating the amount of blow-down required.

The Bulletin is available free of charge from the Ministry of Fuel and Power, London, or from Regional Offices of the Ministry.

Education and Democracy

In the course of summing up a series of lectures on "Education To-day and To-morrow" given during the 1943–44 Session of the Royal Society of Arts, Dr. R. W. Holland, O.B.E., Principal of Pitman's College, said that adult education furthered by stunts and advertisements is not worth while; the subjects may thus be doped, but they will not be educated; they may get mental comfort, but they will have no energy for mental stimulus. Democracy can be kept alive by educating the people, but not by instructing the masses. Better to set a good standard of education for those who are prepared to make a mental effort than to expend energy on the forcible feeding of a mass-hypnotized community.

"It would appear to me," he continued, "that, while the recreational side of adult education and the purely technical side can be state-provided and directed, that part of adult education which deals with the many problems which will decide and determine the freedom of the community to live the democratic way of life must come from the people themselves, and the controlling initiative must be in their hands. We require a democratic community alert enough to do its own thinking, and to create a public opinion strong enough to preserve the democratic way of life. Adult education must be free, it must not be confused with entertainment and amusement, and it must demand some mental effort on the part of those who participate in it. The residential school should be the crowning glory, and it should be so independent that it may lay down its own rules for acceptance of its pupils and not be forced to take inferior material by reason of its lack of funds."

During the discussion Dr. Holland added: "Equality of the sexes has nothing to do with education. It has to do with the peculiar physical and psychological differences between two bodies of persons, and I do not think we can lay down any hard and fast rules with regard to men and women. The best teachers I have come across have been women. The average man as a teacher gives what he is paid to give and no more. The average woman, on the other hand, gives herself."

Diary

Oct. 14.—Manchester and District Junior Gas Association: Visit to Gas Street Works, Bolton, 2 p.m.

Oct. 16.—London and Counties Coke Association: Finance Committee, 10.30 a.m.; Executive Committee, 11 a.m.; Central Committee, 12 noon; Annual Luncheon, 1.0 for 1.15 p.m.; Annual General Meeting, 2.45 p.m.; Grosvenor House, Park Lane, W. 1.

Oct. 17.—B.G.F. Domestic Heat Services Committee: Gas Industry House, 2.30 p.m.

Oct. 21.—Western Junior Gas Association: Meeting at Exeter Gas-light and Coke Company's Offices, Exeter, 3 p.m.

Oct. 27.—Manchester District Association of Gas Engineers: Autumn General Meeting.

Nov. 4.—Scottish Junior Gas Association (Eastern District): Visit to Galashiels Gas-Works.

Nov. 7.—Southern Association of Gas Engineers and Managers (Eastern District): Films, "Boiler House Practice" and "Steam Utilization"; discussion opened by Mr. W. H. Gamble; Gas Industry House, 2.30 p.m.

In the discussion on the organization and work of the Gas Engineering Advisory Boards at the Cardiff meeting of the Wales and Monmouthshire Association of Gas Engineers and Managers, reported in the "JOURNAL" last week, it was Mr. A. Pickard (Llanelly), not Mr. J. Powdrill (Pontypool), who reported an improvement from 20% to 8.26% in unaccounted-for gas in his area since 1942.

Area Gas Supply*

By W. HODKINSON and H. B. TAYLOR, United Kingdom Gas Corporation

(*Continued from p. 443*)

Centralized Production in Coke Ovens

The advantages accruing from centralization of production can be attained in many types of carbonizing plant and on any site offering good transport facilities, particularly where rail and water transport are available. In the South Wales area it would appear obvious that central production should be sited in large units at the pithead or at locations conveniently situated to a group of colliery units; this latter position is attractive in that it would be possible, under normal conditions, to plan a programme of coal blending designed to meet the requirements of the most economic coke market.

From time to time the use of coke ovens as a gas-producing unit has received attention in the Gas Industry, but development has been largely restricted by virtue of the size of an economic unit. The Paper presented by E. G. Stewart to The Institution of Gas Engineers in 1929 entitled "The Function of Coke Ovens" dealt in considerable detail with the possibilities of their use in the Gas Industry, and his summary of the position at that date may perhaps be quoted. Coke ovens—

(1) Would seem to be of interest to only the eight largest undertakings, who together treat some 37% of the total coal carbonized by the Industry, and to have been rejected by them already;

(2) cannot compete with continuous vertical retorts unless of over 1,000 tons per day capacity;

(3) require a ground space greater than any existing gas-works carbonizing plant; and

(4) produce a coke which would need special care in marketing, especially if the undertaking produced coke of an entirely different character, such as vertical coke.

Mr. Stewart qualified his statements at that time by pointing out the possibilities of amalgamation of gas undertakings, or, presumably, the development of Area Gas Supply schemes such as is envisaged in this Paper.

In the past fourteen years conditions have changed considerably, and it would now appear that the development and possibilities of coke as a clean smokeless fuel make coke ovens worthy of consideration as a centralized production unit for gas-making purposes in connexion with area supply schemes.

Capital Cost of Ovens

In Table II is shown the cost of a coke oven unit, having a capacity of 1,200 tons *per diem*, as compared with similar costs in respect of horizontal and vertical carbonizing plant.

TABLE II.

	Vertical Retorts. Cost per ton *per diem.*	Horizontal Retorts. Cost per ton *per diem.*	Coke Ovens. Cost per ton *per diem.*
	£	£	£
Coal handling plant	125	95	37
Coal storage tower	—	—	42
Oven battery or carbonizing plant complete	528	395	316
Coke quenching and conveying plant ...	15	25	30
Gas producer plant...	—	—	92
Total	£668	£515	£517

Labour

It is generally conceded that with economic size of unit considerable advantage is gained in the number of operatives required on coke ovens as compared with other types of carbonizing plant of similar size. Table III is given for comparison purposes with Table I to indicate the advantages of bulk carbonization generally from the point of view of labour costs.

TABLE III.

	Coke Ovens. 1,200 tons *per diem.*
Number of men:	
Coal handling	2
Carbonizing	24
Producers	19
Coke handling	9
Foremen, heaters, &c.	18
Exhausters	3
Boilers	6
Total men per diem	81
Tons of coal per man	15

This Table is based on the operation of coke ovens as a gas-producing unit taking up the fluctuation of gas demand throughout the year by the operation of producer gas firing. In a scheme of Area Gas Supply certain plants could, with advantage, at times of good coke demand, be worked as base load plants. Under such conditions without the operation of producers the tonnage of coal handled would increase to a figure of 19.0 tons per man *per diem*.

Flexibility

Coke oven units are designed essentially for operation at constant maximum throughput; maximum life and efficiencies are achieved by virtue of this procedure. It is, however, possible to attain a large degree of flexibility in modern compound ovens by working proportions of a battery on producer gas firing and varying the proportions in relation to the weekly demand for gas. In the efficient gas-works it is assumed that the daily variations in load throughout any one week can be accommodated by the use of adequate gasholder storage capacity; this is of prime importance to the operation of any system of bulk supply mains forming a grid network.

For coke-making purposes a battery of coke ovens is normally built in a single block or battery, and it is common practice to work the battery at maximum throughput, without major repairs, to the end of its life. In constructing for purposes of manufacturing town gas it would be necessary to provide for adequate repair programmes without jeopardizing supplies to the area system. This can be done by building ovens in smaller blocks or batteries, and in the design of a plant having a capacity of 1,200 tons of coal *per diem* requiring 60 modern ovens we would propose constructing them in six blocks of 10 ovens, thus reducing the margin of standby plant necessary when repairs or renewals are in progress. This proposal is not new; it was adopted some years ago in a large unit in Lancashire which was primarily designed for the production and sale of coke oven gas to several adjoining gas undertakings. The proposal is now generally accepted by those members of the Gas Industry who are experienced in the purchase and utilization of coke oven gas.

Costs of Production in Coke Ovens

For the purpose of examining the economics of an Area Gas Supply system in South Wales we have assumed that the gas requirements of the system would be met from coke ovens situated at the pithead. It is reasonable to suppose that coal would be supplied from the pit to ovens at a price somewhere approaching the normal "transfer price," which from our experience is generally rather less than the "weighted average price of coal disposable commercially" in any given coal area, as normally returned by the Ministry of Fuel and Power. At the present time, in the South Wales area, this figure is approximately 35s. 7d. per ton. Centralization of production at the pithead, while saving carriage charges on coal, will entail additional rail charges on coke to the gas undertakings' yards, it being visualized that the latter will be responsible for marketing this product. For the purpose of estimating, we have taken a figure of 49s. 6d. per ton of coke at ovens, which is based on the average price at present received for good-class graded coke at ovens, less the average rail charge for coke delivery from ovens to gas-works station. It is admitted that in the present type of coke market as developed by the Industry, this price will be very difficult to maintain post-war. It is suggested that if the domestic coke market is developed with the aid of the modern coke appliances now available, and serviced in the true sense of the word, we have little to fear on the question of coke prices.

Table IV is an estimate of the cost of producing purified town gas in a modern battery of compound ovens based on the coal and coke prices previously quoted, and on an intimate knowledge of the costs applicable to a similar but smaller battery erected in this country within recent years. In this table we arrive at the cost of gas per thousand cu.ft. purified and delivered to the inlet of compressors, when operating the plant as a normal gas-producing unit and meeting the contours of the gas demand curve put forward as typical for an Area Gas Supply system. In estimating, we have provided for the dilution of the straight coal gas by the admixture of producer gas, assuming with Welsh coals of good quality a final calorific value of 500 B.Th.U. per cu.ft. Conservative figures have been taken in respect of labour charges, and in arriving at the costs of repairs and maintenance we have regard to the need for a high standard when meeting the requirements of statutory gas undertakings. In arriving at capital charges on the plant we have taken a comparatively high rate of depreciation, but assumed that dividend and interest charges would average 4¼% on the total capital of the coke oven undertaking.

Coke Ovens in South Wales

There are eleven coke oven plants in the South Wales area. Two plants are operated in conjunction with steelworks, and may be disregarded, as it is unlikely that they will have exportable gas or coke in any quantity. One plant is also operated in conjunction with a steelworks, but supplies considerable quantities of town gas to one under-

* A Paper to the Wales and Monmouthshire Association of Gas Engineers and Managers, Sept. 28, 1944.

TABLE IV.—Estimated Analysis of Cost of Manufacture, Maintenance, and Management in Pence per 1,000 cu.ft. of Gas Sold from a Coke Oven Plant having a Capacity of 1,200 Tons of Coal per diem.

Cost of production in a coke oven battery operating on part coke oven gas and part producer gas firing to meet the gas needs of an Area Supply Scheme.

Net Yields.

Coke ... 13.42 cwt. per ton of coal.
Gas ... 8,228 cu.ft. do.

	£	Pence per 1,000 cu.ft.	£	Pence per 1,000 cu.ft.
Coal ... ... 438,000 tons at 35/7d. per ton...			779,275	51.89
Less Residuals:				
Coke ... ... 293,898 tons at 49/6d. per ton...	727,398	48.43		
Sulphate ... ... 3,813 tons at £8 per ton	30,504	2.03		
Refined benzole ... 810,300 gall. at 2/od. per gall.	81,030	5.40		
Tar ... ... 15,330 tons at 55/od. per ton...	42,158	2.80		
			881,090	58.66
Net cost of coal		Cr.	101,815	6.77
Operating Labour (Ovens and Producers):				
Operating ... ... 29,200 shifts at 16/od. per shift	23,360	2.05		
Labour ... ... 10,500 shifts at 14/od. „	7,035	.47		
Foremen ... ... 3,650 shifts at 18/6d. „	3,377	.22		
			33,772	2.24
Repairs—materials ... 5.0d. per ton of coal			9,125	.61
„ labour ... 4.0d. „ „			7,300	.49
Sulphate Production:				
Sulphuric acid ... 3,410 tons at 79/6d. per ton	13,555	.90		
Lime ... ... 341 tons at 36/od. „	618	.04		
Bags, &c. ... ... 13/od. per ton of sulphate	2,478	.17		
			16,651	1.11
Steam ... ... 119,000 tons at 3/6d. per ton			20,825	1.39
Water ... ... 98,000,000 galls. at 6.0d. per 1,000 galls.			2,450	.16
Electricity ... ... 4,380,000 units at 0.5d. per unit			9,125	.61
Benzole Recovery and Rectification:				
Wash oil ... ... 110,000 galls at 8.5d. per gall....	3,896	.26		
Acid and soda ... 0.3d. per gall. refined benzole	1,013	.07		
			4,909	.33
Purification ... ... 0.25d. per 1,000 cu.ft. gas for sale			3,750	.25
Management			6,750	.45
National Insurance, &c.			600	.04
Rents, rates, &c.			4,000	.27
Depreciation on plant (7½% on £934,200)			70,065	4.66
Interest and Dividend (4¼% on £934,200)...			39,705	2.64
Total cost of gas purified and metered into holder			127,212	8.47

Estimated Gross Yields.

Coal carbonized ...	Wet coal, 10% moisture.
Coke	14·75 cwt. per ton of coal.
Gas	11,000 cu.ft. „
Sulphate	19.5 lb. „
Benzole (crude) ...	2.5 galls. „

Estimated Capital Cost.

Carbonizing plant, including coal and coke-handling plant ...	£555,000
Producer gas plant	110,000
By-product and purification plant	222,500
Meters and holders	34,200
Buildings and services	12,500
Total	£934,200

Assumed Capital Structure.

5% Maximum Dividend Stock	£311,400
4¼% Preference Stock	311,400
3½% Debentures	311,400
Total	£934,200

taking. It is assumed that this supply will be maintained but not increased, and that there will be no exportable coke from this source.

Of the remaining eight, one is shut down; two are old and uneconomic units; three have some years' life left, but may not be rebuilt; and two are modern plants.

There are a number of new sites for coke ovens in the area with excellent coal reserves, at one of which preliminary work is advanced.

Coke

Normally the replacement of standard gas-works type plant by coke ovens would add considerably to the quantity of coke available for sale in a given area; with the present conception of coke markets this might give rise to overloaded markets and slumped prices. If compound ovens, heated by producer gas in accordance with the gas demand of an area, be used, the position is very different.

During 1939, coke produced for sale in the area, excluding the coke ovens connected with steelworks, approximated to—

Coke ovens	800,000 tons
Gas-works	120,000 „
	920,000 tons

If the 38 undertakings in the area took bulk supplies from modern coke ovens, allowing producer gas heating for six months each year, coke for sale—apart from that at the coke ovens connected with steel works—would approximate to—

On 1939 gas loads . .	500,000 tons
On "future" loads . .	1,100,000 „

The 1939 production of coke for sale (920,000 tons), if made in modern ovens fired with producer gas for six months each year, would provide approximately 10,500 million cu.ft. of gas for disposal, or sufficient to cover an 85% increase on the 1939 requirements of the 38 undertakings.

If the gas demand increases beyond this point, it is suggested that there should be little difficulty in developing the domestic market in the area, which would pass to the coke oven operators as the gas-works shut down, the undertakings acting as agents or retailers. This market is largely unused to graded coke, and striking developments should be possible.

By attention to blending of coals and suitable modifications to coking times it is possible to achieve the production of a coke eminently suitable for the domestic market; recent developments in methods of producing reactive cokes will also assist in providing the correct fuel for this market.

For long term planning, it might be assumed that the gas demand would increase to eight times the 1939 loads—*i.e.*, a total coke production of approximately 3,000,000 tons per annum, or an increase of 2,000,000 tons (200%) on 1939 coke production.

If the Gas Industry is satisfied that coke has a part to play in the future domestic heat service field, then such quantities would be but a fraction of the total requirements of that market.

It may be concluded that with modern ovens no additional coke need be made in the area until the gas demand approaches twice that of 1939. Thus the proposed scheme would help rather than hinder the coke marketing position in the immediate post-war years.

Gas Specification and Control

In the scheme of Area Gas Supply considered in this Paper it is assumed that the coke ovens would be owned either by colliery companies or by coke oven companies sponsored by the Gas Industry. The distribution mains would be owned by a statutory Gas Distribution Company responsible to the individual undertakers purchasing bulk supplies from the mains system for continuity of supply and maintenance of gas specification. Agreements for supplies of gas between the coke oven undertakings and the distribution company should provide adequate facilities for inspection and gas testing by distribution company personnel on the coke oven plants.

The gas supply specification would be common to all sources of supply, and as a matter of interest we give details of the specification adopted by the West Yorkshire Gas Distribution Company throughout its area.

The gas shall—

(*a*) Be purified gas.

(*b*) Be free from sulphuretted hydrogen as proved by the test prescribed by the Gas Referees.

(*c*) Be free from tar as ascertained by the usual tests applied in ordinary gas-works practice.

(*d*) Contain not more than ½ grain of ammonia per 100 cu.ft.

(*e*) Contain not more than 12 grains of cyanogen per 100 cu.ft.

(*f*) Contain not more than 1 grain naphthalene per 100 cu.ft. during the period May 1 to Oct. 31, and not more than ¾ grain per 100 cu.ft. in the period from Nov. 1 to April 30 in any year.

(*g*) Contain not more than 4% of carbon dioxide.

(*h*) Contain not more than 0.5% of oxygen.

(*i*) Contain not more than 17% of total inert gases.

(*j*) Be of a density not exceeding 0.48 (air = 1).

(*k*) Be of a maximum calorific value after such dilution with producer gas as may be necessary of 515 B.Th.U. (gross) per cu.ft. of gas calculated at 600°F. and 30 in. mercury and saturated and a miminum value of 500 B.Th.U. gross as aforesaid, and the average calorific value shall be not less than 505 B.Th.U. defined as aforesaid over a 24-hour period. The gas to be tested is to be taken at the outlet of the gasholder if any.

(*l*) Be delivered at such pressure as required by the Gas Company, but not to exceed 30 lb. at the outlet of the compressors.

(*m*) Be delivered into the Gas Company's mains at a temperature of not more than 5°F. in excess of the temperature of the cooling water used.

It will be noted that a standard calorific value of 500 B.Th.U. per cu.ft. has been adopted for the scheme, and it follows that we have achieved over an area of 560 square miles the standardization which is so highly desirable.

Bulk Distribution of Gas

It will be appreciated that before any firm proposals can be made much preliminary work is necessary. It is however possible, *for use as a basis of discussion*, to prepare a preliminary scheme and to cost this out with a view to gauging the economics of the proposals; this has been done. Throughout, care has been taken with all calculations and all costs and assumptions are conservative. It may therefore be expected that any later detailed examination of the proposals would show only economies.

The following assumptions have been made:

(1) All undertakings now purchasing bulk supplies from coke ovens forego these contracts and purchase from the grid.

(2) All coke ovens now selling gas to undertakings forego these contracts and sell purified gas to the grid.

(3) All existing bulk supply mains (except that to Newport) are ignored.

(4) The mains have been designed to meet an assumed future maximum day of 55 million cu.ft. The inputs to the system have been assumed as: 40 million cu.ft. per day at one point; 15 million cu.ft. per day divided between seven points.

It should be pointed out that an input of 40 million cu.ft. per day at one point is an unlikely condition, but has been taken as the most costly and difficult circumstance as regards distribution that could arise.

The grid is divided into two sections.

The estimating prices used are based upon actual costs of the West Yorkshire Gas Distribution Company's system adjusted to take up increased costs (averaging 80%) up to and including 1942. Present-day costs are some 20% higher, but it is thought that post-war costs will fall below those included. The prices allow for all preparatory work, a high degree of workmanship in mainlaying, 3 ft. of cover where buried; elsewhere for the mains being supported over ground, valves at intervals of one mile and in pits where appropriate, special crossings, daywork, reinstatement and 10% normal contingencies. In addition, in view of the difficult country in certain parts of the area, and the fact that only a small part of the route has been surveyed, a special contingencies item of 20% has been allowed throughout.

Prices used are:

	£		
4 in.	2,400	per	mile
6 in.	3,000	,,	,,
8 in.	3,700	,,	,,
10 in.	4,500	,,	,,
12 in.	5,450	,,	,,
15 in.	7,400	,,	,,
18 in.	9,000	,,	,,
20 in.	10,500	,,	,,
24 in.	13,000	,,	,,

All plus 20%.

It is assumed for the purpose of this Paper that the necessary capital could be raised on the following basis:

£500,000	5% Maximum Dividend Stock	£25,000
500,000	4½% Preference Stock	21,250
500,000	3½% Debentures	17,500
£1,500,000	4¼% Average Interest	£63,750

It is known that these rates would be attractive to private investors at the present time. The post-war trend of interest rates cannot, of course, be forecast.

It is further assumed that any agreement with the coke oven companies which would justify the construction of a grid would be for a period of 20 years, and the system is depreciated over this period. The life of the mains might be taken at up to 60 years, and therefore in practice sinking fund charges might well be at a lower figure.

The total capital charges thus become:

Average interest charges	4.25%
Sinking Fund on 3% basis, 20 years' term	3.72%
Total charges	7.97%

Three load conditions are considered:

(*a*) 1939 loads (the last generally available).

(*b*) Future loads (generally not less than 100% increase on (*a*)).

(*c*) Average loads (average of (*a*) and (*b*)).

In all cases the mains sizes are designed to meet future loads (*b*), but costs are worked out for conditions (*a*), (*b*) and (*c*).

It may be that in a number of cases wartime increases have brought present-day loads above the "future loads" included for. It will be appreciated that the greater the loads to be handled by the system per unit length, the smaller will be the operating costs. In order, therefore, to err on the right side, the above conservative estimates of the future loads have been adopted.

One of the first requisites, if the scheme be developed, would be a survey of the potential industrial demands for gas at the prices which might be expected were bulk supplies made available. It would then be found that in many cases the future loads to be provided for would be not twice but many times the 1939 loads.

The importance of maintaining a 100% hourly load factor is stressed. In this district it has been customary in the past when distributing purified gas at high pressure to take services off the trunk mains where required. Undertakings now taking crude coke oven gas are in the habit of keeping their holders full, adjusting the take to suit the demand. Both these practices cannot be permitted with a major scheme of bulk supply of purified gas as now proposed. The day's requirements must be taken into holders steadily over the 24 hours and distributed from holders through proper low-pressure systems, the holders being worked to take up variations. The bulk distribution costs which follow apply only to a scheme where this method of working is followed.

On the West Yorkshire Gas Distribution Company's system, laid largely in areas subject to mining subsidence, and at present working at 35 lb. per square inch initial pressure, the gas lost in transit averages 3.5%. For the purpose of this Paper a figure of 7.0% has been assumed.

The cost of compression has been taken on the basis of data included in a Paper given by the Authors to the Coke Oven Managers' Association at Sheffield in April, 1942, the cost of steam being assumed at 3s. 6d. per ton (1s. 7d. per 1,000 lb.).

The cost of operating the gas grid, rates, &c., has been based upon West Yorkshire Gas Distribution Company costs.

The various costs are assembled in Table V under the three load conditions, the average cost of 500 B.Th.U. gas delivered into the holders of each of the 38 works in the area being:

1939 loads	16.29d./1,000 cu.ft.
Future loads	14.09d. ,,
Average loads	14.83d. ,,

It will be noted that there is little difference in the average cost of Sections 1 and 2. If Section 2 be broken down into a number of sub-sections average costs of each remain of the same order. Hence the scheme could be proceeded with step by step without its economics being upset, provided that all undertakings in any sub-section co-operate. Section 1 is geographically less suitable for breaking down into sub-sections unless, as appears probable, suitable sites for centralized production can be found.

The average cost of gas delivered to works under the scheme should be compared with the weighted average cost of gas into holder of all the undertakings as at present situated. The authors make no attempt to assess this cost; the information is not readily available, nor is there sufficient uniformity in computation to enable worth while averages to be obtained without very detailed investigation of each undertaking's accounts. However, the representatives of undertakings here present will be able to form their own comparisons, and the Authors believe that few will be able lightly to disregard the figures given. To provide some guide the recent cost into holder at six representative works of different sizes is given in Table VI.

There is a further important factor of which no account has been taken in the foregoing comparison. The majority of company-owned undertakings, and all municipally-owned undertakings, would sooner or later obtain relief which may be expected to amount to from 4d. to 8d. per 1,000 cu.ft., depending upon the date when major renewals and/or extensions fall due, through the necessity for such expenditure having been eliminated by reason of the bulk supply. The extent of this relief cannot be assessed without a detailed technical and accounting study of each undertaking.

It will have been noted that no provision has been made for the cost of maintaining standby plant. The Authors envisage the central production works, whether operated by the coking or gas interests, being conducted in a manner in every way comparable to the best

TABLE V.—Average Cost of Gas Delivered to Undertakings.

	1939 loads.			Future loads.			Average loads.		
	Section 1.	Section 2.	Total.	Section 1.	Section 2.	Total.	Section 1.	Section 2.	Total.
Works supplied: No.	17	21	38	17	21	38	17	21	38
Length of main: Miles	116¾	118	234¾	116¾	118	234¾	116¾	118	234¾
Loading: Million cu.ft. per annum	3,714	2,028	5,742	7,620	4,275	11,895	5,670	3,152	8,822
Compress to: lb./sq. in.	20	20	20	35	35	35	30	30	30
Capital cost	£850,000	£578,000	£1,428,000	£850,000	£578,000	£1,428,000	£850,000	£578,000	£1,428,000
Interest and Sinking Fund charges at 7.97%	£67,750	£46,100	£113,850	£67,750	£46,100	£113,850	£67,750	£46,100	£113,850
Cost of gas at inlet to compressors d./1,000 cu.ft.	8.47	8.47	8.47	8.47	8.47	8.47	8.47	8.47	8.47
Compression charges, including capital do.	1.03	1.03	1.03	1.28	1.28	1.28	1.22	1.22	1.22
Interest and Sinking Fund Charges do.	4.37	5.48	4.74	2.12	2.29	2.29	2.87	3.51	3.09
Operating expenses do.	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Rates do.	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
Gas lost in transit (say 7.0%) do.	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59
Average cost of gas delivered to works do.	15.92	17.03	16.29	13.92	14.40	14.09	14.61	15.25	14.83

TABLE VI.—Cost of Gas into Holder when Manufacturing.

Undertaking.	1939.		1940.		1941.	
	Make. Million cu.ft.	Cost. Pence/1,000 cu.ft.	Make. Million cu.ft.	Cost. Pence/1,000 cu.ft.	Make. Million cu.ft.	Cost. Pence/1,000 cu.ft.
A	600	19.3	660	19.4	680	20.5
B	165	21.2	170	24.0	175	35.6
C	70	25.1	75	27.1	85	27.0
D	25	23.2	30	28.0	30	35.7
E	20	23.2	20	35.8	22.5	28.1
F	15	31.0	17.5	27.1	20	33.0

present-day gas-works practice. Certainly the statutory obligation to maintain supplies must be shouldered by them. There is no reason why a large works should be any more liable to failure than a small works. If then all the production stations are interconnected, the position will be amply covered if there is sufficient reserve capacity to meet the total failure of one source of supply. The full flexibility of producer gas firing is not required to meet the seasonal changes in gas demand, the balance remaining available for emergency operation. If, then, one plant were to fail, the gas demand can be at once met by increasing the proportion of producer gas used at the other plants. Not until there are a number of plants connected to the grid would this be strictly correct, and in the early stages of development some undertakings would be expected to maintain their plants as standby. The initial cost of these precautions would be quickly lost as the scheme came into full operation. A failure of any grid main would be covered by the holder stocks of each undertaking, holder capacity being fully maintained after a works ceases to produce, augmented by partial supplies in such cases where it had been possible to provide ring mains.

Basis of Charge from Bulk Supplies

There are many factors to be taken into account when considering the design of a system of charge for gas supplied through a bulk distribution scheme, and it may be suggested that regard should be paid to the following points:

(*a*) Load factor.
(*b*) Distance from point of manufacture.
(*c*) Annual requirements.

Alternatively, it may be considered that in a scheme of rationalization such as is envisaged in this Paper a good case can be made out for the averaging of bulk distribution costs throughout the area. We are of the opinion that charges to undertakings connected to an area supply scheme should be based upon some form of tariff designed to facilitate the maximum development of new and additional business, and the availability of attractive scales of charges in each undertaking's area.

Numerous types of complicated bulk tariff scales can be designed to cover the many requirements of our Industry, but for the purpose of demonstrating the possibilities we give details of two simple forms of tariff, both having been designed to meet the requirements of a grid supply scheme.

Tariff "A"

The load at each works taking supplies from the distribution system is divided into—

(*a*) Replacement load—all gas supplied up to the quantity manufactured in the year prior to taking bulk supplies, and—
(*b*) New load—all gas in excess of (*a*).

The price charged by the distribution company for the replacement load would bear some relation to the average cost of manufacture at each works prior to closing down. The price for new load would be the same to all undertakings, large or small. In this way the more efficient undertakings would not be prejudiced by the less efficient, while all would be equally placed for developing new business.

Tariff "B"

The load at each works is divided, on a commonly agreed basis, between domestic and industrial consumption; a tariff is then applied in blocks somewhat on the following lines, based upon the economics of the distribution undertaking:

Type of load.	Consumption.	
Domestic	First 20 million cu.ft. per annum	A pence per 1,000 cu.ft.
	Next 40 " " "	B " "
	" 40 " " "	C " "
	" 100 " " "	D " "
	" 200 " " "	E " "
	All over	F " "
Industrial	First 20 million cu.ft. per annum	G " "
	Next 80 " " "	H " "
	" 100 " " "	K " "
	All over	L " "

The price charged for gas from coke ovens to the distribution company would be based upon an agreed basic price per thousand cu.ft., plus the variations of a reasonable slide based upon the incidence of the cost of coal. This coal slide would apply to the basic charges under the bulk supply tariff.

The distribution company being a maximum dividend undertaking would return all surplus profits to the gas undertakings supplied, by adjustments to the tariffs where necessary.

Conclusions

The Authors hope that this Paper, which, through the courtesy of the Wales and Monmouthshire Association, has been made available to such a representative gathering of the fuel interests of South Wales, may serve to stimulate general interest in an idea which they are convinced will in no small measure help to secure for the Industry and people of South Wales the prosperity and standard of living they so merit. Their proposals are, and can only be, of a most general nature, and much hard work and, above all, co-operation will be required before any detailed plan can be formulated. How best to set up machinery for this purpose is beyond their province. They are confident that means will be found.

In conclusion they would express their thanks to Colonel W. M. Carr, O.B.E., T.D., for the facilities, permission, and encouragement which have enabled them to present this Paper.

(A report of the discussion will be published subsequently.)

The Minutes of the Lighting and Cleansing Committee presented to the Exeter City Council on Sept. 26 revealed how, at short notice, despite the damage and losses suffered by both undertakings in the air raids of 1942, the Exeter Gaslight and Coke Company and the Corporation Electricity Department managed to provide a total of 390 lighted lamps under the modified street lighting scheme recently permitted. It was stated that because of the loss of fittings the majority of the gas lamps in operation, numbering 240, must be lighted by hand, while in many of the residential street areas it is possible only to light alternate lamps, owing to damage to fittings. The number of electric lamps in operation is 150. The Committee has placed on record its thanks to the Gas Company for the large number of lamps made available, and its appreciation of the work of the City Surveyor and City Electrical Engineer and their Departments.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in the "Journal" should not be taken as an indication that they are necessarily available for export.

Training and Qualities of the Gas Engineer

The following written contributions were made to the discussion on the Paper to The Institution of Gas Engineers by Mr. G. C. Pearson (see "JOURNAL" of June 21):

Mr. G. E. Currier (Bradford): Mr. Pearson points out that five years of war have proved the qualities of gas engineers. While this may be true generally, the results achieved, good as they have been, could have been better. This is confirmed by the necessity for the formation of the Gas Engineering Advisory Boards to help those undertakings whose manufacturing results were below standard, and also to assist those in difficulty in maintaining their supplies of gas.

Mr. Pearson produces striking figures showing the crying need for integration, when he quotes the large number of small gas-works producing only a very small percentage of the total gas made in the country. He suggests that the reconstruction of the Gas Industry may be on the lines of the Agricultural Committees, where each county forms a Committee of selected farmers who advise and direct the working of individual farms. Surely this would not be the best way to run the Gas Industry. The obvious way would be to bring all the undertakings in each region under the control of a Board of Experts in Finance, Fuel Technology, Production, Distribution, Utilization, By-products, Law, Publicity, &c. These experts would control the production, distribution, and utilization of gas throughout the Region, and would have at their disposal the whole financial and material resources, together with the personnel, of every undertaking in the Region. The Regional Boards would carry out the policy laid down by the Central Board, similarly composed of all the necessary experts in every branch of the Industry, allowing for variations in policy to meet local conditions and circumstances. This flexibility is essential. In other words, this is control of the Gas Industry by public ownership, but it is not control by nationalization. Public ownership is entirely different from nationalization, and this cannot be stressed too strongly, as there is undoubtedly much confusion of thought on this subject.

Many of the suggestions made by Mr. Pearson under the heading of "Regional Training" would be provided for under the scheme which I have outlined above, and there would be no need for any Gas Engineering Advisory Boards, such as constituted to-day, and in any case their activities must of necessity be considerably cramped by the fact that they have no compulsory powers.

Mr. Pearson itemizes the personnel necessary for the administration of a large gas-works, consisting of a station engineer, supervising engineers on shift work, carbonizing engineer, and water gas production engineer, &c. In the scheme of public ownership which I visualize the gas production unit would be of such size as would warrant such staff in each case, and the younger men coming into the Industry to receive their training at each of these Producing Stations would have the fullest opportunity for receiving training in the operation of all the latest types of plant and machinery.

Under the heading of "Practical Proposals" the question of salaries is dealt with under No. 4, but unfortunately Mr. Pearson does not tell us how this very vexed question of salaries is to be put right. This question of salaries has been under discussion for a considerable number of years, and it must be obvious to everyone now that the only way of ensuring fair and adequate salaries for gas engineers, and those technical officers serving under them, will be by the formation of an Association which will deal only with the salaries and conditions of employment of gas engineers and their officials, and nothing else, and that such an Association would then negotiate and agree scales of salaries with a representative body of employers.

Mr. J. T. Haynes (Bournemouth): It is interesting to note that among the factors affecting future development of the Gas Industry first place is apparently given to the training of personnel followed by an expression of the trainees' outlook. One cannot help but be gratified with the able way in which Mr. Pearson on the one hand, and Messrs. Platt and Bujnowski on the other, have set out their respective viewpoints. The two are so inter-related that any discussion on the one Paper must touch on subjects dealt with by the other, and I therefore feel that my contribution to the discussion should be in respect of the two Papers taken together.

It can hardly be questioned that in any undertaking the "junior" is ndispensable to the "senior." In all but the smallest undertakings every chief official has to rely to a very great extent upon his staff, composed of "juniors," for the carrying out of routine matters connected with the undertaking and also for any special investigations in which the "chief" is interested. It will also be agreed that the "chief" is to some extent dependent upon the "junior" for suggestions and improvements. If indispensability is admitted, then obviously the role of the "junior" in the Gas Industry is a problem which immediately concerns the "seniors" even more than the "juniors." If one looks ahead and agrees that the posts now held by the "seniors" must in due time be occupied by the "juniors" of to-day, it will be realized that the responsibility for the future rests on the present leaders of the profession in so far as they have to guide the rising generation and prepare it for future responsibility.

In the training of this rising generation the first essential is to see that the right type of young man is selected for admission into the Industry. Education, personality and physical fitness all must be taken into consideration. Having got the right type of lad it is then the responsibility of the "seniors" to see that a suitable course of training is followed. Much has already been done by the Institution's Education Scheme, and it is generally accepted that technical and academic study must be rounded off by a proper course of practical training. In all too many cases, however, this is somewhat haphazard, and it is now suggested that the larger undertakings—say those of 1,000 million cu.ft. a year and upwards, should be utilized as training centres through which students can pass and which will be prepared to carry more than the normal number of pupils.

The lead given by Watson House in the training of district personnel might well be copied or adapted to the provision of training centres for works personnel by the larger undertakings. *The pupils would be trained for service for, and at the request of, other undertakings, who would obviously have to retain a measure of responsibility.* There should be a proper course of workshop experience, with a period in the drawing office, followed by a period in the laboratory, leading to minor technical control of plant on the works. There should also be a course of practical training on the distribution side of the undertaking, including mainlaying, gas-fitting, &c., and a gradual introduction to administrative control.

By the time this course of training is completed the student will have shown an aptitude for one or other branch of the Industry's activities, and also to what extent he is likely to develop into a "small works" man or a "large works" man. Arrangements should then be available for the "junior" to undertake minor responsibilities either on the training works or on the works of the undertaking which sponsored him. He should be given opportunities in which his talents are most likely to be of use and productive of results, thus adding interest to his work and entitling him to appropriate increased remuneration. He should be encouraged to apply for jobs in other undertakings with a view to gaining experience. In this connexion attention is drawn to the Australian custom of giving "juniors" up to 12 months' leave of absence to enable them to accept jobs with other undertakings. If a man does happen to be a "square peg in a round hole" he can go back to the parent undertaking for a time and be usefully employed there before he has another try. This, of course, cannot be continued indefinitely.

During this period of the "junior's" existence his first endeavours must be to make himself efficient and successful in any job for which he is immediately responsible. All too many "juniors" having reached years of discretion seem to think themselves already qualified for the more advanced positions, and because these do not fall into their laps like ripe apples they become disgruntled and fail to give satisfaction in their own jobs. Such a mentality is unlikely to be of service in those councils where the highest policies have to be determined. If the "junior" shows that he can be relied upon in his present position, he is more likely to receive recognition and promotion to posts of greater responsibility. Those "juniors" who during their course of training have shown that they have a "bent" in one particular direction can be given opportunities and encouragement to specialize. Here again the services of the larger undertakings are necessary.

At this point one might add a word on the vexed question of remuneration. While all will agree that wages and salaries should be sufficient to enable a decent standard of life to be lived by everyone in the Industry, any attempt to fix scales of salaries for different positions irrespective of ability would tend to result in what one might call a "Civil Service" mentality—one which engenders a striving for security of position at the expense of enterprise and initiative. Much of the progress of the Gas Industry has resulted from the movement of young men from one undertaking to another, with a resultant widening of outlook and a dissemination of new ideas; and such experience and ability generally commands satisfactory remuneration. There is also a danger of fixed scales of salary throughout the Industry leading to "inbreeding"—the habit of waiting for dead men's shoes—and ultimate stagnation.

The anticipated post-war conditions in the Gas Industry, along the lines of technical development, higher fuel efficiencies, and increased utilization of gas, together with higher policies for raising the status of the Industry as a whole in relation to other fuel industries, will call for many active minds, highly trained technically, and rich in experience. We look to the "juniors" for the effective carrying out of policies decided upon by the leaders of the Industry, and in this work they will qualify themselves for the high responsibilities of guiding those policies in the future. That future depends on the training given to the "juniors" by their "seniors."

Mr. Walter T. Dunn (Hastings): Mr. Pearson rightly points out how the Institution, by its Royal Charter, improved the status of the gas engineering profession. Since the Charter was acquired in 1929 how has this improvement revealed itself? The Institution's voice is now regarded as of importance in the consideration of the many and diverse questions confronting the fuel industries as time goes on. Unified pronouncements can now be made which before were not possible.

(*To be concluded*)

Gas Water Heater Development and the Question of Maintenance

RECENTLY we had the opportunity of seeing in detail the results of development work by Radiation Ltd. on gas water heater design, and we were both interested and impressed by these results. For some years now Radiation has paid special attention to the maintenance factor in gas water heater operation, the aim being to reduce this factor to an absolute minimum; and the purpose of this note is to describe how and to what effect the firm has tackled the problem—a problem easily stated but by no means so readily solved. The method of approach has been twofold—first to eliminate corrosion on what we may term the "gas faces" of the appliance, and secondly, but concurrently, to eliminate the formation of scale on the water faces. Both factors are of obvious importance in their bearing on the life of the appliance, its maintenance cost, and its continued high thermal efficiency, on which, of course, depends its running cost.

Now sheet copper is the material most commonly employed in water heater construction on account of its high conductivity and ease of fabrication. It is suitable for both soft and hard waters, but it offers no great resistance to corrosion by products of combustion, even when it is coated with less readily attacked alloys. This corrosion is intensified when non-condensing features are incorporated, and there results a gradual formation of dry copper salts which are light and bulky and which may choke the flue-ways. In contrast, much of the corrosion product is washed away in condensing heaters—a feature of importance in favour of such construction, as many old appliances still in use bear witness. although the removal of condensate may prove troublesome. Freedom from condensation in a water-heating appliance is desirable provided the production of deposits by attack upon the surfaces can be avoided. Reduction in sulphur content of town gas will contribute materially to reduction in corrosive attack, and is in consequence a matter for earnest attention in post-war gas manufacture. Radiation has, however, approached the problem from another angle—that of seeking materials of superior corrosion resistance to products of combustion, so that even with existing levels of sulphur content attack may be minimized.

The outcome of these investigations is the use of a heat and corrosion resisting steel alloy to which has been given the name "Radaloy." This material conforms to a restricted specification not easy of satisfaction. It must be heat and corrosion resistant, of good thermal conductivity to ensure rapid heat transfer, and of a coefficient of thermal expansion which is the same as that of copper, for it is used in conjunction with copper in the fabrication of the heaters. The thermal conductivity factor has necessitated detailed investigation being made to ensure that a transfer efficiency in the heater of 75% gross may be attained. The method of fabrication of the form finally approved technically represents a departure from earlier practice in that autogenous welding rather than brazing has been chosen. The quality of brazing materials available has not been sufficiently satisfactory in corrosion resistance to warrant their use, although they have been extensively tried. Autogenous welding itself introduces a fabrication problem which has required solution, for the special alloy steels are not uniformly recommended for fabrication by this process on account of the difficulty of weld decay.

Extended district trials covering periods up to three years under conditions particularly favourable to corrosive attack have been carried out, and throughout the gas faces of the heaters have required no maintenance attention. Inspection at intervals of four to six months has indicated that no attack is to be expected, and there is reason for thinking that on the gas faces at least, need for maintenance attention has been reduced to the minimum, if not eliminated entirely, and that it is more likely that difficulties arising from the nature of the water (*e.g.*, hardness) may be the determining factor in regard to maintenance.

The "New World" Circulator

Radiation Ltd. favours the use of a "gas unit" of 4,000 B.Th.U.—a unit the firm proposed 14 years ago, and this and the principles we have outlined have been applied to a gas-heated circulator available in two sizes with heat inputs of 1½ and 3½ "gas units" respectively, and a transfer efficiency of 75 %.

We will describe the general principles of construction. The water body is of heavy gauge sheet copper tinned inside and providing a water annulus ⅜ in. wide. All seams, joints, and connexions of the water body are brazed, and the connexions are especially reinforced to avoid straining during installation. We come to the heat exchanger, which combines within a patented construction, which we shall detail later, a "Radaloy" sleeve with welded joint, together with a bank of fins in the same material which are autogenously welded into position. The "Radaloy" sleeve is about ⅛ in. smaller in diameter than the inner face of the water body, and contact is secured by filling the annulus with metallic particles which are packed into position to secure close disposition. The bottom edge of the sleeve is flanged outwards and is bolted to the base of the body through a "Radaloy" baseplate. The application of "Radaloy" with a thermal conductivity appreciably below that of copper has involved the application of new methods of fabrication, an element of which is the introduction of a special welding process to ensure thoroughly satisfactory joints without impairing the qualities of the material in the process.

A removable cast-iron baffle treated in a heat and corrosion resisting vitreous coating directs the combustion products through the fin block to secure effective scrubbing of the gaseous products. A removable perforated flue cap secured by bayonet fixing surmounts the top of the heat exchanger. While the water body is of copper construction, the combustion products come into contact with "Radaloy" surfaces only.

Now for the burner unit. This comprises a cast-iron burner body fitted with non-aerated jets. The pilot has a separate line to the service connexion; a gas adjuster and a gas filter removable without breaking the service connexion are included. There is a safety cut-off valve of robust construction incorporating a bimetal lever thermally operated. The usual pressure point is provided for adjustment of gas rating. The burner assembly is mounted on an enamelled base and may be withdrawn from the heater by releasing three thumbscrews, together with the burner and pilot unions, thereby permitting easy inspection of burner jets and safety cut-off valve.

The outer casing, with its white vitreous enamelled finish, is attractive.

Water Treatment

We turn now to the elimination of scale formation. Under hard water conditions, continued thermal efficiency calls for descaling at intervals. Certain compounds are available which, if dissolved in hard water to the extent of even two to five parts per million only, have remarkable effects upon its properties, particularly in the direction of minimizing hard water scale formation. With such compounds available the problem facing Radiation Ltd. became one of dispensing uniformly throughout the water supply to the appliance the correct and minute quantities of reagent necessary, the differing demands from appliances of the instantaneous and the storage types being taken into account.

Development work has resulted in the evolution of a "dispenser," incorporating the venturi principle to secure proportionate dosage of the reagent. The "dispensers"—the outcome of this work—are of robust construction in non-ferrous alloys for attachment to water mains, and they are capable of withstanding hydraulic pressure of 300 lb. per sq. in. The reagent is contained in a gauze cylinder positioned in a container. Extensive district tests in many different parts of the country and under widely differing conditions of hard water supply have indicated that annual replacement of the charge within a dispenser of size appropriate to the water demand will usually almost completely suppress the formation of scale within the appliance, provided the water temperature does not exceed 170°F. There is evidence available that even with hard waters dosed by the active reagent and maintained above 170°F., the characteristic scale normally formed is changed to a soft powdery deposit easily removed from the water walls and completely different from the hard deposit from similar water not treated by the active reagent. In addition, practical experience has shown that the very small dosage of the active reagent tends to soften very slowly existing hard water scale formed on a storage heating unit, and to precipitate it as a powdery material on the base of the vessel. The temperature limit mentioned does not inflict any hardship upon the user, as temperatures beyond 140°/160°F. are unnecessarily high, and contribute to inefficient fuel utilization owing to the higher heat losses involved.

Radiation claims—and we think with justification—that this combination of measures to prevent corrosion of combustion faces by gaseous products and of scale deposition during the process of heating hard water is a positive step in the direction of simple maintenance. It is a matter of prevention rather than cure.

The work has been the subject of patent specifications which we will now outline.

The Heater

Many materials have been tested over a period of years and the experience gained has led to a combustion chamber and gilled structure made from a heat-resisting and corrosion-resisting ferrous alloy of the kind containing about 18% chromium, about 8% nickel, and about 2.5 to 3.5% of molybdenum (Patent No. 562,435). By increasing the number of gills in the structure and reducing the spaces between them it is not difficult to attain the desired thermal efficiency without undue increase of the dimensions of the apparatus.

One particular alloy used contains also not more than 0.45% manganese, between 0.5 and 1.0% of silicon, and less than 0.08% of carbon.

Fig. 1 is a sectional side elevation of the water heater, which is provided with a vertical annular water chamber *a* mounted coaxially within an outer vertical cylindrical casing *b* and forming the main part of the heater body. The chamber and the greater part of the casing are made from copper sheet. The annular chamber *a* is provided with the usual pipe connexions as *d* through which water

For every size of works and every class of coal...

WEST'S

CARBONIZING PLANTS

GLOVER-WEST VERTICALS

WESTVERTICAL CHAMBERS

440 carbonizing plants have been built or are under construction by West's in 24 countries. Working results from a wide variety of gas coals have established the high efficiency and adaptability of the West systems.

WEST'S

GAS IMPROVEMENT CO · LTD ·

MILES PLATTING MANCHESTER 10

TELEPHONE—COLLYHURST 2961-2-3-4-5 TELEGRAMS—STOKER MANCHESTER

LONDON OFFICE: COLUMBIA HOUSE, ALDWYCH, W.C.2 TELEPHONE: HOLBORN 4108-9 TELEGRAMS: WESGASCO ESTRAND

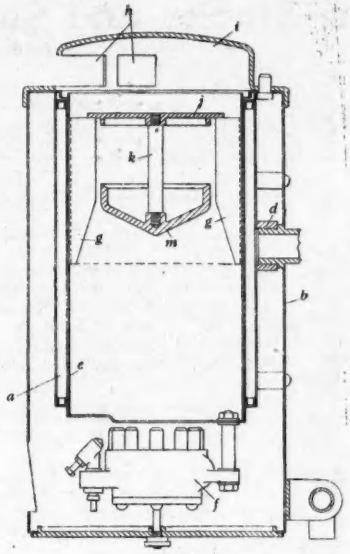


FIG. 1.

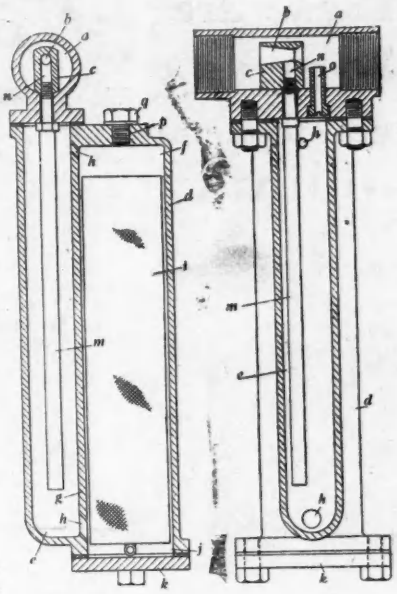


FIG. 2.

FIG. 3.

can enter and leave the chamber and which extend through the outer casing *b*. Arranged within and in close contact with the inner periphery of the annular chamber *a* is a vertical cylindrical liner *e* made from the alloy specified and which extends slightly beyond the upper and lower ends of the chamber. A gas burner *f* is situated in the casing *b* at the lower end of the space enclosed by the liner *e* which serves as a combustion chamber. In the upper part of the liner is arranged a gilled structure also made from the alloy and comprising radially disposed gills *g* forming narrow passages through which the hot gases can pass from the combustion chamber to a lateral outlet aperture or apertures *h* in a hollow cover piece *i* on the upper end of the heater. Preferably and as shown the gills *g* are formed in pairs. Thus, each pair is made by bending or folding a metal sheet so as to form a pair of radial sides united at their outer edges by a part adapted to make close contact over an ample area with the inner surface of the liner. The gills do not extend over the whole of the interior of the liner, but only along about one half. The region between the inner edges of the gills is closed at its upper end by a circular baffle *j* which rests on the upper edges of the gills. Depending from and secured at its upper end to the centre of the baffle is a vertical bolt *k* to the lower end of which is secured another circular baffle *m*, the latter being situated within and near the lower end of the region between the inner edges of the gills *g*, and being shaped to deflect the rising products of combustion into the spaces between the gills.

Details of design or construction of the combustion chamber and gilled structure may be varied to suit different requirements. In all cases, however, these parts of the heating apparatus are made from the kind of alloy specified.

The "Dispenser"

We will now consider the water treatment (Patent No. 561,629).

Figs. 2 and 3 are sectional elevations taken at right angles to each other of the dispensing apparatus. There is a hollow member forming a main passage *a* having at its opposite ends means for connecting it in a water supply pipe. In this main passage is arranged a relatively small sub-passage *b* in the form of a venturi throat, the axis of this passage being parallel with that of the main passage. It is convenient and preferable to mount the sub-passage in the main passage but this is not essential. As shown the sub-passage is formed by a block *c* mounted in the main passage so as to provide in the latter a space at each side of, and preferably also above the block. To prevent the sub-passage from being constricted by sludge or other deposits from water flowing through the main passage it is preferably located near the upper part of the main passage.

At the underside of the hollow member forming the main passage is arranged a closed chamber *d*, this member forming a removable cover for the upper end of the chamber. The chamber is divided into two compartments *e*, *f* by a vertical partition *g*, the two compartments being in communication with each other through holes *h* in the upper and lower end portions of the partition.

The compartment *f* is adapted to contain the liquid to be dispensed. When the liquid is a solution of solid substance (such as, for example, sodium hexametaphosphate), this substance may be placed in a perforated container *i* which can be inserted or withdrawn through a lower aperture *j* in the chamber *d*, this aperture being normally closed by a plug or cap *k*.

In the other compartment *e* is arranged a tubular duct *m*, which at one end communicates with the narrow part of the sub-passage *b*, and at the other end is open to the compartment *e*. When the substance to be dissolved consists of a slowly soluble agent, such as sodium hexametaphosphate, the tubular duct *m* may be formed as shown by a vertical tube which at its upper end extends through the lower side of the main passage *a* and communicates with the narrow portion of the sub-passage *b* through a port *n* in the block *c*, the latter having a screw thread connexion with the upper end of the duct *m* which at its lower end is open to the lower end of the compartment *e*. Another passage *o* is provided for establishing communication between the main passage and the compartment *e*. This passage *o* may consist of a tube extending through the base of the main passage *a* at one side of and adjacent to the tube *m*. Preferably and as shown the upper end of the tube *o* is situated above the base of the main passage *a* and slightly below the inlet of the sub-passage *b*, so that obstruction of the tube by sludge or other deposits in the main passage is less likely to occur. In any convenient upper part of the chamber *d* an air vent *p* may be provided, this being normally closed by a removable plug *q*.

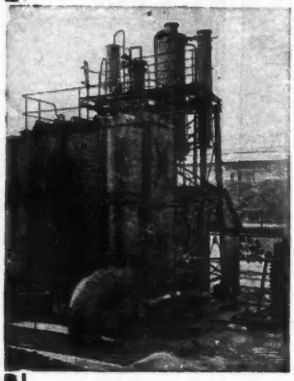
The dimensions of the venturi, liquid chamber, and ducts are, of course, made appropriate to the amount of water flowing and the quantity of the substance required to be dispensed.

When in use the chamber *d* is full of water obtained from the main passage *a* and is automatically replenished from the same source. The solid material in the perforated container *i* is slowly dissolved by the water in the chamber *d*, but as the solution can only escape to the sub-passage *b* through the tube *m*, it is only withdrawn (and then in small dosage) when water flows through the main and sub-passages *a*, *b*, the difference of pressure due to the higher velocity through the sub-passage supplying the motive agency whereby the solution is withdrawn and discharged into the main stream.

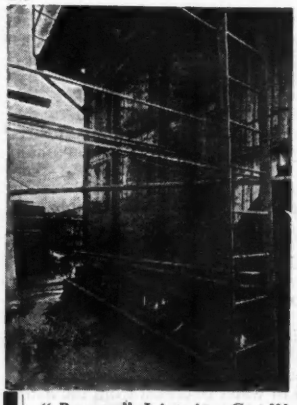
The Colonial Gas Association, Ltd., reporting on operations during the year ended June 30, state that the net profit was £82,746, after providing £38,000 for taxation. After adding the balance brought forward and deducting the interim dividend paid in April, amounting to £41,605, there is a balance at credit of the net revenue account of £46,743. Dividends have been declared at the rate of 8% per annum (Australian currency) on the Preference Shares (less interim dividend of 4% paid in April), and at the rate of 5% per annum (Australian currency) on the Ordinary Shares (less interim dividend of 2½% paid in April), both rates being the same as for the previous year. Gas sales from the Association's works showed a decrease of 0.8%, but sales by subsidiary undertakings showed an increase of 11.5%.

The Important Part which the welding industry will play in post-war building is discussed in the Jan.-June, 1944, issue of the *Welder*, just to hand. The hope is expressed that the encouragement being given to welding in official quarters will be followed by more detailed assistance as regards codes of practice. A standard code would, it is pointed out, ease the work of the engineer and architect and speed up the production of drawings and details. Moreover it would minimize the trouble still experienced in trying to break down the conservatism of those who will not permit structures to be welded because they have no previous experience of the process.

These are "Permac" metal-to-metal Joints



"Permac" Joints in a Gas Works.



"Permac" Joints in a Gas Works.

Ever since 1913 "PERMAC," the original Metal-to-Metal Jointing, has been holding up difficult joints like these in important Gas Works and on Coke Oven Plants all over the world. Equally suitable for any joint—steam, water, gas, oil—screw pipe or flange.

Wouldn't it pay you to use it?

Send for particulars to the manufacturers:

THOMAS & BISHOP LTD

(formerly of 37, Tabernacle Street, London, E.C. 2)

Temporary address:

39, Arthur Road, Wimbledon Park, London, S.W. 19

Products Prices—Stocks and Shares

The London Market Oct. 9.

The prices of Coal Tar Products are unchanged.

A Government Order came into effect on March 1 controlling the price of Benzole and Coal Spirit and replacing the Control of Coal Tar Naphtha and Xylole Order, 1943.

The Order is known as the Control of Benzole and Coal Spirit Order, 1944 (S.R. & O. 1944, No. 172).*

By this Order the price of Motor Benzole is fixed at 2s. per gallon. The Order also lays down the method of evaluating Crude Benzole.

The Order also calls for periodical returns to the Ministry of Fuel and Power from all producers of Crude and Refined Benzole.

In connexion with the Coal Tar products market, the Government Order designated the Contol of Toluene (No. 4) Order, 1944 (S. R. & O. 1944, No. 170), contains an amendment of the Control of Toluene (No. 3) Order, 1943.

Attention is called to a new Government Order, which amends the price of Toluene as from Sept. 1, 1944. The Order is entitled, The Control of Benzole and Coal Spirit (No. 2) Order, 1944 (S. R. & O., No. 988).

The only change in connexion with the prices of Coal Tar Products refers to Naphthalene. A new Government Order, entitled the Coal Tar Products Prices (No. 2) Order, 1944 (S. R. & O. 1944, No. 1051), allows increases in the maximum prices for all forms of Naphthalene. The new Order came into force on Sept. 22, 1944.

* Slightly amended by Control of Benzole and Coal Spirit (No. 2) Order, 1944, which amendments came into force on Oct. 1.

The Provinces Oct. 9.

The average prices of gas-works products during the week were: Pitch and Crude Tar,* Toluole, naked, North, 90's, 2s. to 2s. 2½d., pure, 2s. 9d. (now controlled by S. R. & O. 1944, No. 988, operative from Sept. 1, 1944. Benzole and Coal Spirit, also Coal Tar Naphtha and Xylole, are now controlled by the Control of Benzole and Coal Spirit Order, 1944, dated Feb. 18, 1944, S. R. & O. 1944, No. 172, operative from March 1, and S. R. & O. 1944, No. 988, part 1, operative from Oct. 1, 1944. Carbolic acid, 60's, anthracene, creosote oil (hydrogenation), coal tar oils (timber preservation, &c.), and strained anthracene oil controlled by the Coal Tar Products Prices Order, 1943, dated Oct. 20, 1943 (S. R. & O. 1943, No. 1528), operative from Nov. 15, 1943. Naphthalene now controlled under S. R. & O. 1944, No. 1051, operative from Sept. 22, 1944.

* In regard to pitch and crude tar prices we would ask readers to refer to the editorial note on p. 396 of the "JOURNAL" for Sept. 10, 1941.

Scotland Oct. 7.

Tar acids are more plentiful and other products are unchanged. Refined tar*: Yield to distillers is 4½d. per gallon *ex* Works, naked. Creosote oil: Timber preserving quality,* 5½d. to 6½d.; hydrogenation oil*; 5⅞d.; low gravity or virgin oil,† 7¼d. to 7½d.; benzole absorbing oil,* 6½d. to 8d. per gallon. Refined cresylic acid* is 3s. 6d. to 4s. 6d. per gallon, *ex* Works, naked, accordingly to quality. Crude naphtha 6½d. to 7d. per gallon; Solvent naphtha*: Basic prices delivered in bulk, 90/160 grade, 2s. 8d., and 90/190 Heavy naphtha, Unrectified, 1s. 10½d.; Rectified, 2s. 2d. per gallon. Pyridine†: 90/160 grade, 13s., and 90/140 grade, 15s. per gallon.

* Price controlled. † Uncontrolled.

Throughout the greater part of last week markets remained inactive and subdued, although just before the close sentiment appeared to be more cheerful. A widespread fractional improvement took place among British Funds, while several leading industrials also recorded small rises.

There was very little increase in the volume of business among Gas stocks and shares, although with few exceptions quotations closed unchanged. Imperial Continental stock fluctuated, and eventually closed on Thursday last 4 points lower at 112¼. The Argentine Government's increased offer led to a rise of 9d. in Primitiva Holdings, but this was not fully maintained, and at the local exchange Newcastle units reacted 6d. A parcel of Hampton Court ordinary changed hands at 105 and the price rose 5 points in the Supplementary List.

The following quotations were changed during the week:

OFFICIAL LIST

Barnet Ord.	155—160	+1
Imperial Continental	110—115	−4
Montevideo Ord.	85—90	+2
Primitiva Holdings, Ltd., Ord. ...	10/—12/−	+−/6d.
South Suburban 4 p.c. Pref.... ...	97—102	+1

SUPPLEMENTARY LIST

Hampton Court Ord.	100—105	+5
Romford 4 p.c. Deb. (x.d.)	97—102	Oct. 2

PROVINCIAL EXCHANGES

Derby 4 p.c. Deb.	97—102	+2
Long Eaton 5 p.c. Deb.	108—113	+3
Newcastle Units	25/3—25/9	−−/6d.

Address your orders and enquiries for

HUMIDINE

The unique anti-corrosion paint for gasholder cuppings, etc.

To the sole manufacturers

ASPINALLS (PAINTS) LIMITED

CARLETON — SKIPTON — YORKS

TOM CARRINGTON & CO. LTD.

Lyndon Toolworks, West Bromwich. T/N 0517 (2 lines).

"LYNDON" and "EGA-KUT"

SCREWING TOOLS;

TAPS; DIES; STOCKS AND DIES;

GROUND THREAD TAPS

Arkon

INSTRUMENTS

Gas Flow Recorders and Indicators
Pressure and Vacuum Recorders and Indicators
Full Scale or Inclined Gauges

WALKER, CROSWELLER & CO. LTD.

CHELTENHAM, GLOS. Cheltenham 5172

CLAYTON, SON & CO. LTD.

Moor End Works, Hunslet, Leeds. T/N Leeds 75226-9. T/A Gas Leeds. London Office: 2, Victoria Street, S.W. 1. T/N Abbey 1754 or Ashtead 502.

GASHOLDERS of all types; BOILERS, PIPES, TANKS, &c.

MAVITTA DRAFTING MACHINES LTD.

Park Road, Aston, Birmingham. T/N East 0482. T/A Mavitta, Birmingham.

Machines for all Boards. Perfectly Balanced Tables. "Teantee" Blue-print Machines. ENTIRELY BRITISH.

SPENCER-BONECOURT LTD.

Wartime Address: Cambridge Road, Hitchin, Herts. T/N HITchin 907-8. T/A Bonecourt, Hitchin.

Specialists in Waste Heat Recovery. Waste Heat Boilers for Steam Generation from Waste Gases. Industrial Gas-fired Boilers, Tubes, Valves.

CONTENTS

EDITORIAL NOTES

Rehabilitation and Training . . 498
I.E.S. 498
Housing Equipment 499
The Fall in Coal Output . . . 499

Personal 499

National Gas Council 500
Scottish Eastern Juniors . . . 500
Institute of Fuel 500
Diary 500
Vertical Water Tube Condensers . 501
Southern Association. 501
After Five Years—Photographs of Street Lighting 501

The Production of Gaseous Hydrocarbons by the Hydrogenation of Coal. By F. J. Dent, D.Sc. . 502
Area Gas Supply 508

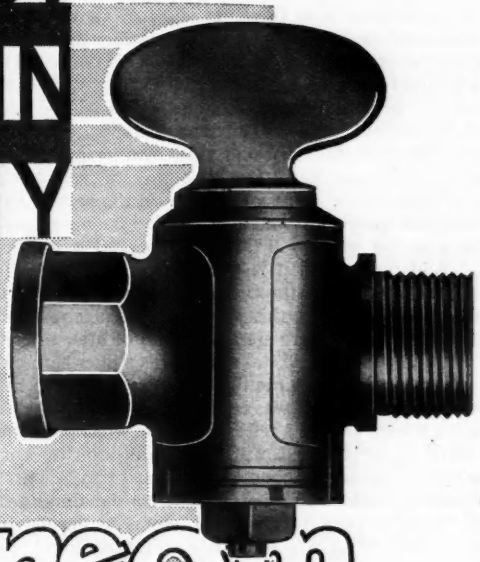
Gas Products Prices 513
Gas Stocks and Shares 513

THIS WEEK'S ADVERTISERS

	PAGE
Aeraspray Manufacturing Co., Ltd.	495
Alder & Mackay, Ltd.	S2
Aspinalls (Paints), Ltd.	514
Bale & Church, Ltd.	516
Birmingham Electric Furnaces, Ltd.	488
Blakeley, Firth, Sons & Co., Ltd....	516
Bratt Colbran, Ltd.	492
British Fittings Co. (Hendon), Ltd.	S3
Broadbent, J. C., & Co., Ltd. ...	516
Concrete Proofing Co., Ltd. ...	S2
Cowan, W. & B.	Cover III
Crane, Ltd....	515
Crookston, S., & Co., Ltd. ...	515
Curtis, A. L.	515
Dempster, Robert, & Sons, Ltd. ...	516
Derbyshire Silica Firebrick Co., Ltd.	515
Detel Products, Ltd.	S3
Eagle Range & Grate Co., Ltd...	495
Electric Contruction Co., Ltd. ...	514
Gas Meter Co., Ltd.	486
Gas Purification & Chemical Co., Ltd.	516
Glover, George, & Co., Ltd. ...	485
Glover, Thos., & Co., Ltd.	Cover I
Grant, David, & Co.	494
Green & Boulding, Ltd.	516
Griffin & Tatlock, Ltd.	493
Griffiths Bros. & Co. (London), Ltd.	S6
Hamilton, Archd. H., & Co., Ltd.	514
Harrisons (London), Ltd.... ...	516
Holmes, W. C., & Co., Ltd. ...	S1
Horden Collieries, Ltd.	S3
Horseley Bridge & Thomas Piggott, Ltd.	493
Humphreys & Glasgow, Ltd. ...	496
Jeavons Engineering Co., Ltd.	Cover IV
Jenkins, W. J., & Co., Ltd. ...	491
Keith Blackman, Ltd.	S8
King's Patent Agency, Ltd. ...	515
Le Bas Tube Co., Ltd.	S7
Mewburn, Ellis & Co.	515
Newton Chambers & Co., Ltd....	506
North British Rubber Co., Ltd. ...	489
Quasi-Arc Co., Ltd. ...	Cover IV
Pegson, Ltd.	S5
Pulsometer Engineering Co., Ltd.	Cover IV
Radiation, Ltd.	510, 511
Reavell & Co., Ltd.	S4
Russell, R., & Sons, Ltd. ...	S3
Sawer & Purves, Ltd.	509
Siebe, Gorman & Co., Ltd. ...	515
Slingsby, Walter, & Co., Ltd. ...	494
Sperryn & Co.	497
Staveley Coal & Iron Co., Ltd. ...	S6
Stein, John G., & Co., Ltd. ...	S8
Stoves, Ltd....	486
Strachan & Henshaw, Ltd. ...	485
Thomas & Bishop, Ltd.	513
Trotter, Haines & Corbett, Ltd.	516
Turbine Furnace Co., Ltd. ...	514
Underpressure Engineering Co., Ltd.	515
Walker, C. & W., Ltd.	509
West's Gas Improvement Co., Ltd.	512
Whessoe Foundry & Engineering Co., Ltd.	487
Wilson, Geo., Gas Meters, Ltd.	Cover II
Winn & Coales, Ltd.	490
Withinshaw, A.	515
Trade Cards	513
Appointments Vacant and Wanted	516
Educational	516
Gas-Works for Sale	516
Patents	515
Plant, &c.	516
Plant, &c., For Sale and Wanted...	516

The "Journal" and "Gas Service" Offices are at 51, High Street, Esher, Surrey. 'Phone: Esher 1142.
Communications addressed to Bolt Court have to be forwarded, and this causes delay.

THE FOREMOST GAS COCK IN THE INDUSTRY



THE 'SPERSOM' GAS COCK possesses unique and valuable features of construction.

THE SELF-LUBRICATING FEATURE utilizes the principle of capillary attraction. Consequently oil is fed constantly from a small reservoir in the head of the plug thereby replacing any lost in service.

THE APPLICATION OF THE SPRING LOADING to the plug is carried out in a special manner, which ensures that the plug is always retained on its bearing at a uniform pressure. Dismantling is never necessary.

COCKS FOR ALL PURPOSES can be supplied with these features—Main Service, Gas Fire, Gas Cooker, etc.

Spersom

REGISTERED TRADE MARK

MADE IN ENGLAND BY SPERRYN & CO., MOORSOM ST. BIRMINGHAM